# **Galactic Miners: Game Design Document**

## **1. Overview**

**Galactic Miners** is a modular idle strategy game set in a distant future where humanity has colonized multiple star systems. With Terra as the core, colonies on Mars, Zalthor, Vulcan, and Noctaris Prime supply vital resources. As players expand resource extraction, develop new technologies, and build fleets, they must also contend with raider attacks led by vengeful ex‑citizens. The game combines resource management, real‑time production, strategic building placement, research‑driven progression, and turn‑based combat.

## **2. Story and Lore**

### **Backstory**

Humanity’s expansion into space has led to a fragile balance among colonies. Terra—the heart of civilization—supplies the foundation, while peripheral worlds provide specialized resources. Amid the prosperity, past betrayals and resource conflicts have given rise to raider factions.

### **Old Miner Joe**

A weathered veteran of the mines, Joe’s story is one of resilience and redemption. Born into a family of miners on Terra, he witnessed firsthand the hardships of resource extraction in a rapidly industrializing society. After a personal tragedy that claimed the lives of his kin in a mining accident, Joe dedicated his life to perfecting extraction techniques. His deep knowledge of the mines and a knack for improvisation have made him an indispensable mentor to younger miners. Beneath his gruff exterior, however, lies a lingering hope that every ounce of ore he unearths is a step toward mending the broken ties of his past.

### **Professor Lumen**

Professor Lumen is a respected academic whose fascination with planetary anomalies has made her both a scholar and a reluctant prophet. With a background in astrophysics and planetary geology, she was among the first to document the peculiar energy fluctuations emanating from the outer colonies. Her meticulous research, driven by personal loss—a mysterious cosmic event that stole a loved one—has led her to warn of disturbances that could upset the interplanetary balance. Lumen’s insight not only helps drive technological progress but also forces the system’s elite to confront uncomfortable truths about corruption and impending chaos.

### **Farmer Daisy**

Daisy’s role extends beyond her title; she is the soul of the agricultural communities that underpin human survival in space. Growing up on a struggling colony on Terra, she learned early that food and resource extraction are two sides of the same coin. Daisy’s pragmatic outlook is balanced by an enduring optimism. Her dedication to sustainable farming practices and innovative resource allocation has earned her the respect of both miners and city-dwellers. Daisy’s story is one of nurturing growth in a harsh environment, a reminder that every harvest is as crucial as every ore extracted.

### **Captain Blackthorne & Navigator Zara**

Once ordinary citizens, Blackthorne and Zara share a tragic past that transformed them into the charismatic yet conflicted leaders of the raider factions.

* **Captain Blackthorne** grew up in the shadows of Terra’s grand mining complexes, witnessing exploitation and systemic injustice from a young age. Betrayed by the very institutions meant to protect him, he evolved into a revolutionary figure. While his methods are ruthless, his actions stem from a deep-seated belief that the system’s collapse is inevitable if the status quo isn’t challenged. His leadership is as polarizing as it is inspiring—seen by some as a necessary force of change, and by others as a dangerous instigator.
* **Navigator Zara**, on the other hand, once served as a promising pilot within the civilian fleet. Her keen tactical mind and unmatched navigational skills quickly earned her recognition. However, like Blackthorne, personal betrayals left deep scars. Zara’s sacrifice during a critical battle wasn’t just a tactical move—it was a poignant act that underscored her commitment to protecting her comrades at all costs. Her legacy is a constant reminder of the thin line between justice and vengeance, fueling the internal conflicts that drive the raider narrative.

### **Old Scout Finn**

Finn is the quiet observer whose experiences in the outer fringes have provided a unique perspective on the growing dissent. Once an explorer and a scout for Terra’s early expansion efforts, Finn has seen the best and worst of humanity. His insights into the conditions that drive ordinary people toward rebellion offer a nuanced understanding of the raider movement. With a lifetime spent on the margins, Finn’s observations carry the weight of lived experience—revealing that neglect and desperation can turn even the most unassuming souls into warriors for change.

These enriched character profiles not only deepen the narrative layers of *Galactic Miners* but also set the stage for players to engage with the moral and emotional complexities of a sprawling interplanetary conflict.

### **In‑Game Lore Delivery**

Lore is shared via randomized dialogue snippets during quests, combat (using raider and resource lore arrays), journal entries unlocked as the story progresses, and interactions with in‑game characters. This narrative depth enriches the player experience and connects gameplay events with the larger story.

## **Quest Progression Outline**

### **Act I: The Rising Threat**

**Theme:** Raiders are on the attack. The player is introduced to a series of urgent missions where peripheral worlds are under siege, and the core must defend its people.

**Key Quests and Events:**

* **Initial Raider Skirmishes:**
  + *Objective:* Protect resource convoys and small outposts on worlds like Mars and Zalthor.
  + *Narrative:* Old Miner Joe and Farmer Daisy explain the importance of safeguarding resources as raider attacks intensify.
* **Defense of Terra:**
  + *Objective:* Repel a significant raider assault on Terra’s borders.
  + *Narrative:* Professor Lumen hints at mysterious cosmic disturbances influencing raider tactics, planting early seeds of systemic imbalance.
* **Uncovering Motives:**
  + *Objective:* Investigate raider bases and collect intelligence.
  + *Narrative:* The player learns subtle details about the societal inequities and betrayals that fuel the raider movement.

### **Act II: The Unraveling Truth & The Pivotal Choice**

**Theme:** As the battle against the raiders escalates, the true nature of the conflict begins to emerge. The player witnesses deep moral conflicts within the raider ranks and the society they oppose.

**Key Quests and Events:**

* **The Climactic Battle:**
  + *Objective:* Engage in a large-scale confrontation against a massive raider force attacking a key colony.
  + *Event:* During the heat of battle, **Navigator Zara sacrifices herself** to save critical assets—marking a turning point in the narrative.
* **The Critical Decision:**
  + *Objective:* In the aftermath of Zara’s death, the player must confront **Captain Blackthorne**.
  + *Choice A: Kill Blackthorne*
    - *Outcome: A segment of the player’s allies see his death as necessary justice, believing it sends a strong message against rebellion. However, his death also martyrizes him, strengthening the resolve of his followers and sowing seeds of doubt among those who feel the system may have gone too far.*
  + *Choice B: Spare Blackthorne*
    - *Outcome: Sparing Blackthorne allows the player to gain insight into his motives and potentially uncover systemic corruption. However, some allies see this as weakness, undermining the player’s authority and emboldening other raiders to rise up, believing the player lacks the resolve to protect the system from internal threats.*
* **Reactions and Fallout:**
  + *Narrative:* The player observes diverse reactions among key characters—some celebrating the elimination of a leader, others mourning the loss of potential change and questioning the fairness of the system.

**Act III: The Crossroads of Order and Rebellion**

**Theme:** The final act forces the player to choose between staying within a corrupt system or breaking free from it. This decision reshapes the entire power structure of the solar system.

**Branch A: Embracing the Corrupt System**

* **Internal Uprising:**
  + *If Blackthorne Survived:*
    - Blackthorne rallies a faction of discontented leaders who see the corrupt system as salvageable.
    - *Objective:* Deal with a well-organized internal coup where the player must crush the uprising.
  + *If Blackthorne Was Killed:*
    - In Blackthorne's absence, a ragtag uprising of farmers and ordinary citizens emerges, questioning whether quelling their desperate rebellion was just. The player is forced to confront the painful trade-off between preserving a semblance of order and sacrificing the very freedoms that fuel the people's hope for true prosperity.
* **Final Decision:**
  + *Objective:* Choose whether to have the rebels face execution or stand trial, which will determine the future legitimacy of the regime.
* **Outcome:**
  + A victory that leaves the solar system under a reformed yet still authoritarian order, or a fractured system with lingering dissent.

**Branch B: Breaking Free from the Corrupt System**

* **Battle for Freedom:**
  + *Objective:* Lead a resistance against a massive fleet commanded by a general loyal to the old corrupt order.
  + *Event:* Allies emerge from unexpected quarters—Blackthorne (if spared) and defectors join the player’s cause—while other factions remain loyal to the status quo.
* **Climactic Confrontation:**
  + *Objective:* Engage in a decisive battle where the player must overcome the combined might of the corrupt regime’s forces.
* **Outcome:**
  + Victory paves the way for a new, independent solar system. The player carves out a unique path forward, reshaping society with a new order driven by freedom rather than oppression.

**Epilogue**

Depending on the choices made throughout Act II and Act III:

If the player joins the corrupt system:

* **If Blackthorne is alive:** He remains imprisoned, but his presence lingers as a symbol of resistance. The people live under a seemingly stable but oppressive regime, where freedom of speech is limited, and whispers of rebellion persist. Many discuss freeing Blackthorne, seeing him as a beacon of hope. Though life appears orderly, a sense of unease and quiet dissent permeates society.
* **If Blackthorne is dead:** His death cements his legacy as a martyr, and people remember his fight against the corrupt system. Even as the regime remains intact, his story inspires small, underground movements determined to honor his sacrifice. The system is stable but fragile, haunted by the ghost of rebellion that refuses to be silenced.

If the player fights against the corrupt system and loses:  
 The corrupt leader’s victory brings about a harsh, unforgiving regime. Without the player to mediate, basic needs like food and shelter become scarce as the leader tightens his grip to ensure no further dissent. The people are downtrodden and broken, with no real hope of resistance. The memory of Blackthorne and the player’s failed rebellion only serves as a grim reminder of what could have been.

If the player fights against the corrupt system and wins:  
 Victory brings liberation, but it also brings struggle. With the old regime dismantled, the solar system lies in ruins, its infrastructure shattered and resources stretched thin. Poverty and hunger are rampant as the people try to rebuild from the ashes of war.

* **If Blackthorne is alive:** He supports the player, working tirelessly to restore order and help the people recover. Yet, doubts persist—can he ever atone for the wrongs he committed? His rebellion began with a legitimate cause, but many good people, including his own comrades, lost their lives due to his misguided actions. The survivors wonder if Blackthorne’s redemption is possible, or if the cost of his revolt will forever haunt their future.
* **If Blackthorne is dead:** His martyrdom cements his legacy as a rebel who dared to challenge a corrupt regime. Though the player was forced to end his life to save the system, his actions and the fight he ignited remain a testament to the legitimacy of the rebellion. His death becomes a rallying cry, inspiring the people to continue striving for justice—even as they mourn the loss of a controversial yet pivotal figure who took bold risks for a noble cause.

In every ending, the epilogue explores the lasting impact on society, the legacy of characters like Navigator Zara and Captain Blackthorne, and how the player’s choices have shaped the future of the solar system. Whether freedom was truly worth the cost or maintaining order came at too high a moral price is left for the player to reflect upon as the credits roll.

### **3. Core Gameplay Mechanics**

### **Resource Management**

**Resources:** The game features 21 resources, including:

* **Raw Materials:** Iron, Copper, Mithril, Coal, Tin, Silver, Gold
* **Refined Products:** Iron Bar, Copper Bar, Mithril Bar
* **Advanced Components:** Engine Parts, Titanium, Titanium Bar, Advanced Engine Parts
* **Special Items:** Fusion Reactor, Accumulator, Obsidian, Crystal, Nanomaterial, Tritium  
   *Note: Many of these resources are currently placeholders; future updates may adjust their names, values, or introduce additional intermediate resources to further enrich the gameplay.*

**Production & Supply Chains:** Resources are produced continuously on each planet according to their base production rates and available facilities. Each planet houses a Mine—a permanent, indestructible structure that serves as the primary source of raw resources. Players must set up semi-complex production chains, linking multiple processing facilities and crafting stations to convert raw materials into advanced components.

To further deepen the strategic layer, players establish and safeguard supply routes between planets, ensuring that critical resources can be efficiently transferred while protecting these convoys from raider threats. As the player's infrastructure evolves, automation features allow production lines and transport systems to operate with minimal manual oversight, streamlining the growth of the base and enabling large-scale resource processing.

#### **Planetary Base Building: A Grid-Style System**

Building on planets now follows a grid-based layout similar to Factorio, where players must plan and manage their bases using interconnected buildings and transport systems.

* **Grid Layout:** Each planet’s building area (plot size) is increased, allowing for a larger and more flexible grid-based layout. Players can strategically position buildings, production lines, and utility structures to optimize resource flow and efficiency.
* **Building Interconnectivity:** Production is organized in a chain where buildings supply resources to one another. For example, raw materials extracted from the Mine are processed at nearby facilities before being fed into advanced manufacturing units.
* **Conveyor Belts:** To facilitate resource transfer between buildings, players build conveyor belts. These belts are relatively inexpensive, crafted from base resources like Iron Bars and powered by minimal electricity. Despite their low cost, belts are essential for creating efficient and automated production lines.
* **New Building Types:** The building list is expanded to include structures specifically designed for the grid-based system, such as:
  + **Conveyor Belts:** Transport resources between production units.
  + **Resource Transfer Nodes:** Junctions or splitters that manage the flow of materials.
  + **Processing Units:** Specialized facilities that convert raw materials into refined products.
  + **Power Generators:** Provide the required electricity for belt operation and facility upgrades.
  + **Upgrade Stations:** Enhance the throughput of structures like the Mine and processing units.

#### **Integration of New Mechanics**

* **Mines and Upgrades:** The Mine remains a permanent structure on each planet. Its upgrade system allows players to incrementally increase resource extraction rates, ensuring that production scales with the expanding grid-based base.
* **Resource Flow and Logistics:** With the introduction of conveyor belts and interconnected buildings, players must now carefully plan their resource logistics. This system requires balancing production, transport, and processing, adding a new layer of strategic depth to the game.
* **Plot Size Expansion:** Larger plot sizes on planets grant players more area to design intricate production networks. This enables the creation of sprawling bases that can efficiently handle high volumes of resources and advanced manufacturing processes.

### **Planet System**

#### **Terra**

* **Status:** Unlocked by default
* **Production:** Iron (0.5/sec), Copper (0.5/sec), Coal (0.2/sec)
* **Description:** Terra is the beating heart of human civilization. Its diverse landscape—ranging from sprawling urban centers to vast, rugged wilderness—supports a temperate climate and reliable weather patterns. The planet’s rich soil and abundant water resources have spurred technological and industrial growth.
* **Notable Locations:**
  + **Central Mining District:** A sprawling complex where advanced extraction techniques are developed and refined.
  + **Grand Central Hub:** The primary trade and research center, coordinating interplanetary logistics and innovations.

#### **Mars**

* **Status:** Initially locked
* **Production:** Iron (0.1/sec), Copper (0.1/sec), Mithril (0.05/sec), Coal (0.1/sec)
* **Unlock:** Via research ("Unlock Mars")
* **Description:** The Red Planet is defined by its dusty, barren landscapes, gigantic volcanoes, and deep canyons. Frequent dust storms and low atmospheric pressure make life harsh here, but the mineral wealth is undeniable.
* **Notable Locations:**
  + **Valles Marineris Mines:** A labyrinth of tunnels carved into ancient canyons, rich in raw minerals.
  + **Martian Outpost:** A forward base established for resource extraction and scientific exploration.

#### **Zalthor**

* **Status:** Locked
* **Production:** Mithril (0.1/sec), Coal (0.2/sec), Gold (0.02/sec)
* **Unlock:** Via research ("Unlock Zalthor")
* **Description:** Zalthor is a world cloaked in mystery and shadows. Its surface is pockmarked with deep impact craters and jagged chasms. An otherworldly glow occasionally illuminates its dark skies during rare, luminescent storms.
* **Notable Locations:**
  + **Twilight Craters:** Impact sites that yield rare and valuable minerals.
  + **Echo Spire:** An abandoned research facility rumored to contain lost advanced technologies.

#### **Vulcan**

* **Status:** Locked
* **Production:** Tin (0.1/sec), Silver (0.03/sec), Titanium (0.01/sec)
* **Unlock:** Via research ("Unlock Vulcan")
* **Description:** Vulcan is a volatile, volcanic world where the ground is perpetually reshaped by lava flows and eruptions. The planet’s infernal environment is characterized by sulfurous skies and scorching heat, making it a challenging yet vital resource hub.
* **Notable Locations:**
  + **Inferno Crater:** A natural furnace where unique alloys can be forged from the planet’s extreme conditions.
  + **Ashen Ridge:** A mineral-rich plateau formed by ancient volcanic activity.

#### **Noctaris Prime**

* **Status:** Locked
* **Production:** Obsidian (0.1/sec), Crystal (0.05/sec), Nanomaterial (0.02/sec)
* **Unlock:** Via research ("Unlock Noctaris Prime")
* **Description:** Noctaris Prime is perpetually shrouded in twilight, exuding an eerie, mystical aura. Its surface features vast, reflective obsidian plains interspersed with towering crystalline outcrops. The weather is erratic, oscillating between freezing chills and sudden heatwaves.
* **Notable Locations:**
  + **Obsidian Fields:** Expansive regions rich in dark, glass-like minerals.
  + **Crystal Expanse:** A dazzling yet treacherous terrain of natural crystal formations.

### **Additional Notable Locations Within the System**

#### **Raider Hideout**

* **Description:** Hidden within a secluded asteroid belt at the outer edge of the system, this heavily fortified base is the operational center for the raider factions led by Captain Blackthorne and Navigator Zara. Camouflaged by space debris, the hideout poses a constant threat to the colonies.
* **Significance:** Serves as a recurring enemy stronghold and a critical narrative element in conflict-driven quests.

#### **The Celestial Barrens (Meteor Belt)**

* **Description:** A vast, treacherous meteor belt located between Mars and Zalthor. This region is laden with ancient, resource-rich meteors and rare isotopes. Its unpredictable orbits and frequent meteor showers create both opportunities and hazards for mining operations.
* **Significance:** Offers high-risk, high-reward mining prospects and dynamic challenges for resource extraction.

#### **Outpost Nebula-X**

* **Description:** Positioned on the edge of the solar system, Nebula-X is a remote research and military outpost. Surrounded by vibrant nebulae and cosmic anomalies, it serves as a staging ground for expeditions into uncharted territories.
* **Significance:** Acts as a gateway to deeper space exploration and a potential site for uncovering ancient alien technologies that could alter the balance of power.

### **Extraterrestrial Locations Beyond the System**

#### **Imperium Solarex**

* **Description:** The capital planet of a corrupt interstellar regime, Imperium Solarex is a shining example of high‑tech authoritarian control. Its surface is dominated by towering spires, neon-lit cityscapes, and omnipresent surveillance systems. Beneath its pristine exterior lies a web of corruption and rebellion.
* **Significance:** Represents the external political threat and the central power that exerts influence over several star systems. It plays a major role in the broader narrative of oppression and uprising.

### **Energy and Facilities**

**Energy Production & Consumption:**

* **Production:** Facilities such as **Generators** (installed via the “install” command) produce energy.  
   **Solar Panels** (unlockable via research) and **Accumulators** (which increase maximum energy) further boost a planet’s energy pool.
* **Usage:** Energy is required for crafting, production, and powering buildings.

**Special Energy Bonuses:** Ships like the **Sunflare Sloop** can dock with other vessels to grant extra shield regeneration, and installations like the **Helios Beacon** provide bonus energy to nearby planets.

### **Building System**

**Purpose:** Buildings serve to speed up production, enable crafting of specific items or ships, and provide utility functions such as radar detection.

#### **Building Recipes**

Buildings are constructed using specific recipes that detail the required inputs, build time, electricity cost, and building plot space.

**Crafting Building**

* **Recipe:** 5 Iron Bars, 2 Copper Bars; Build Time: 5.0 sec; Electricity Cost: 10.0; Plot Cost: 1
* **Purpose:** Provides a dedicated space for converting refined materials into new items and components.

**Smelting Building**

* **Recipe:** 5 Iron, 10 Coal; Build Time: 5.0 sec; Electricity Cost: 10.0; Plot Cost: 1
* **Purpose:** Processes raw ores into bars, enabling further crafting and resource refinement.

**Facility Workshop**

* **Recipe:** 2 Generators, 2 Accumulators; Build Time: 3.0 sec; Electricity Cost: 5.0; Plot Cost: 1
* **Purpose:** Houses essential machinery for energy production and storage, supporting advanced crafting and building operations.

**Shipyard**

* **Recipe:** 10 Iron Bars, 5 Engine Parts; Build Time: 8.0 sec; Electricity Cost: 20.0; Plot Cost: 1
* **Purpose:** Enables the construction of various ships, from smaller vessels to important combat units.

**Proximity Radar**

* **Recipe:** 2 Crystal, 1 Mithril Bar; Build Time: 3.0 sec; Electricity Cost: 5.0; Plot Cost: 1
* **Purpose:** Scans for nearby hostile activity, enhancing situational awareness on the planet.

**Mobile Radar**

* **Recipe:** 3 Crystal, 2 Copper Bar; Build Time: 3.0 sec; Electricity Cost: 5.0; Plot Cost: 1
* **Purpose:** Offers portable threat detection, supplementing fixed radar systems with added flexibility..

**Shield Generator**

* **Recipe:** 2 Titanium Bar, 2 Copper Bar; Build Time: 4.0 sec; Electricity Cost: 5.0; Plot Cost: 1
* **Purpose:** Provides additional defensive shielding, bolstering the planet’s protection against attacks.

**Solar Panel**

* **Recipe:** None; Build Time: 3.0 sec; Electricity Cost: 0.0; Plot Cost: 1
* **Purpose:** Harnesses solar energy to generate power, offering a renewable energy source to sustain planetary operations.

**Tritium Extractor**

* **Recipe:** 2 Mithril Bar, 1 Advanced Engine Parts; Build Time: 4.0 sec; Electricity Cost: 8.0; Plot Cost: 1
* **Purpose:** Extracts tritium from local resources, a vital component for powering fusion reactors and advanced technologies.

**Defense Turret**

* **Recipe:** 3 Iron Bar, 1 Engine Parts; Build Time: 3.0 sec; Electricity Cost: 5.0; Plot Cost: 1
* **Purpose:** Serves as an automated defensive measure, actively protecting the planet from raider and enemy assaults.

**Flagship Dock**

* **Recipe:** 10 Iron Bar, 5 Engine Parts, 5 Titanium Bar; Build Time: 10.0 sec; Electricity Cost: 30.0; Plot Cost: 2
* **Purpose:** Provides the necessary infrastructure for constructing and docking powerful capital ships, essential for major fleet operations.

**Helios Beacon**

* **Recipe:** 5 Crystal, 2 Advanced Engine Parts; Build Time: 6.0 sec; Electricity Cost: 10.0; Plot Cost: 1
* **Purpose:** Amplifies energy production by delivering bonus power to nearby installations, boosting overall planetary efficiency.

**Plasma Turret**

* **Recipe:** 3 Advanced Engine Parts, 2 Titanium Bar; Build Time: 4.0 seconds; Electricity Cost: 10.0; Plot Cost: 1
* **Purpose:** An advanced turret that consumes a high amount of energy but excels at stripping enemy shields. It intelligently selects targets where shield depletion will have the greatest tactical impact.

**Railgun Turret**

* **Recipe:** 3 Advanced Engine Parts, 2 Mithril Bar; Build Time: 4.5 seconds; Electricity Cost: 10.0; Plot Cost: 1
* **Purpose:** A high-energy weapon designed to deliver devastating kinetic strikes against enemy hulls. This turret prioritizes targets based on their vulnerability to hull damage, maximizing its effectiveness in disabling opposing ships.

### **Research System**

**Function:** Research drives progression by unlocking new planets, reducing crafting times/costs, and upgrading ships and production.

* **Unlock Mars**
  + **Cost:** 100 Iron, 50 Copper
  + **Effect:** Unlocks Mars for mining.
* **Unlock Zalthor**
  + **Cost:** 200 Iron, 50 Mithril
  + **Effect:** Unlocks planet Zalthor for advanced mining.
* **Faster Crafting**
  + **Cost:** 50 Iron, 30 Coal
  + **Effect:** Reduces smelting time by half.
* **Unlock Vulcan**
  + **Cost:** 100 Gold, 100 Mithril
  + **Effect:** Unlocks planet Vulcan for high‑value resources.
* **Unlock Luna**
  + **Cost:** 150 Gold, 100 Mithril
  + **Effect:** Unlocks planet Luna to harvest exotic materials.
* **Crafting Mastery**
  + **Cost:** 5 Engine Parts, 3 Titanium Bars
  + **Effect:** Reduces crafting energy cost by 20%.
* **Shield Technology**
  + **Cost:** 10 Mithril Bars, 5 Titanium Bars
  + **Effect:** Allows building Shield Ships to protect convoys.
* **Emergency Energy Conservation**
  + **Cost:** 10 Engine Parts, 5 Titanium Bars
  + **Effect:** Allows a planet to halt production during an imminent raider attack, conserving energy for defense.
* **Repair Drone Technology**
  + **Cost:** 1 Fusion Reactor, 3 Advanced Engine Parts
  + **Effect:** Unlocks Repair Drones that can repair ships during combat.
* **Solar Panels**
  + **Cost:** 20 Iron, 30 Copper
  + **Effect:** Unlocks Solar Panels for energy production on planets.
* **Tritium Extraction**
  + **Cost:** 5 Mithril Bars, 2 Advanced Engine Parts
  + **Effect:** Unlocks the ability to build Tritium Extractors to harvest tritium for Fusion Reactors.
* **Urban Planning I**
  + **Cost:** 15 Iron Bars, 5 Engine Parts
  + **Effect:** Increases Terra's building capacity by 4.
* **Urban Planning II**
  + **Cost:** 30 Iron Bars, 10 Engine Parts
  + **Effect:** Increases Mars' building capacity by 4.
* **Urban Planning III**
  + **Cost:** 45 Iron Bars, 15 Engine Parts
  + **Effect:** Increases Zalthor's building capacity by 4.
* **Capital Ship Initiative**
  + **Cost:** 5 Advanced Engine Parts, 1 Fusion Reactor, 10 Titanium Bars
  + **Effect:** Unlocks the ability to construct a powerful capital ship (only one such vessel may be active at a time).
* **Auxiliary Frigate Development**
  + **Cost:** 20 Engine Parts, 5 Advanced Engine Parts, 10 Mithril Bars
  + **Effect:** Unlocks smaller versions of capital ships (frigates) that can be built without limits.
* **Escape Pod Lifeline**
  + **Cost:** 5 Advanced Engine Parts, 3 Titanium Bars
  + **Effect:** Allows repair drones and Sunflare Sloops to detach upon ship destruction with a 50% chance to survive.
* **Armament Enhancement I**
  + **Cost:** 10 Engine Parts, 5 Titanium Bars
  + **Effect:** Increases all ships' weapons by 10%.
* **Armament Enhancement II**
  + **Cost:** 20 Engine Parts, 10 Titanium Bars
  + **Effect:** Increases all ships' weapons by an additional 10% (requires previous tier).
* **Armament Enhancement III**
  + **Cost:** 30 Engine Parts, 15 Titanium Bars
  + **Effect:** Increases all ships' weapons by an additional 10% (requires previous tier).
* **Defensive Fortification I**
  + **Cost:** 10 Copper Bars, 5 Mithril Bars
  + **Effect:** Increases all ships' shields by 10%.
* **Defensive Fortification II**
  + **Cost:** 20 Copper Bars, 10 Mithril Bars
  + **Effect:** Increases all ships' shields by an additional 10% (requires previous tier).
* **Defensive Fortification III**
  + **Cost:** 30 Copper Bars, 15 Mithril Bars
  + **Effect:** Increases all ships' shields by an additional 10% (requires previous tier).
* **Structural Reinforcement I**
  + **Cost:** 10 Iron Bars, 10 Coal
  + **Effect:** Increases all ships' hull by 10%.
* **Structural Reinforcement II**
  + **Cost:** 20 Iron Bars, 20 Coal
  + **Effect:** Increases all ships' hull by an additional 10% (requires previous tier).
* **Structural Reinforcement III**
  + **Cost:** 30 Iron Bars, 30 Coal
  + **Effect:** Increases all ships' hull by an additional 10% (requires previous tier).

Each research item deducts resources from Terra and, once completed, applies its effect across game systems.

### **Crafting System**

**Purpose:** Crafting converts raw resources into refined products and ships.

**Mechanics:**

* **Requirements:** Each crafting recipe requires a specific building (e.g., Iron Bar needs a Smelting Building; most ships require a Shipyard or Flagship Dock).
* **Consumption:** Crafting consumes resources and energy and takes a fixed amount of time (subject to research multipliers). Precision Tools research may provide bonus outputs.

### **Fleet and Ship Building**

#### **Ship Types and Base Stats**

**Transport Vessel:** • Hull: 100  
 • Shield: 50  
 • Weapons: 10  
 • Repair: 0  
 • **Range:** Long  
 • **Attack Speed:** 0.5 sec

**Corvette:** • Hull: 100  
 • Shield: 75  
 • Weapons: 30  
 • Repair: 0  
 • **Range:** Medium  
 • **Attack Speed:** 0.5 sec

**Shield Ship:** • Hull: 120  
 • Shield: 150  
 • Weapons: 20  
 • Repair: 0  
 • **Range:** Long  
 • **Attack Speed:** 0.5 sec

**Radar Ship:** • Hull: 110  
 • Shield: 80  
 • Weapons: 25  
 • Repair: 0  
 • **Range:** Long  
 • **Attack Speed:** 0.5 sec

**Salvage Ship:** • Hull: 110  
 • Shield: 70  
 • Weapons: 5  
 • Repair: 0  
 • **Special:** Can salvage destroyed ships for materials  
 • **Range:** Long  
 • **Attack Speed:** 0.5 sec

**Repair Drone:** • Hull: 80  
 • Shield: 40  
 • Weapons: 5  
 • Repair: 0  
 • **Special:** Can dock to provide hull regeneration.  
 • **Range:** Long  
 • **Attack Speed:** 0.5 sec

**Sunflare Sloop:** • Hull: 80  
 • Shield: 60  
 • Weapons: 10  
 • Repair: 0  
 • **Special:** Can dock to provide shield regeneration.  
 • **Range:** Very Long  
 • **Attack Speed:** 0.5 sec

**Interceptor:** • Hull: 90  
 • Shield: 60  
 • Weapons: 40  
 • Repair: 0  
 • **Range:** Very Long  
 • **Attack Speed:** 0.5 sec

#### **Capital Ships**

*Note: Only one capital ship can be active at any time. These vessels are high‑value, one‑of‑a‑kind assets subject to balancing adjustments.*

**Celestial Juggernaut:** • Hull: 550  
 • Shield: 100  
 • Weapons: 80  
 • Repair: 0  
 • **Special:** Also acts as a Cargo ship that can carry a lot of cargo.  
 • **Range:** Short  
 • **Attack Speed:** 1.0 sec

**Nova Carrier:** • Hull: 530  
 • Shield: 120  
 • Weapons: 35  
 • Repair: 0  
 • **Special:** Can launch several small aircraft into battle.  
 • **Range:** Long  
 • **Attack Speed:** 1.0 sec

**Obsidian Sovereign:** • Hull: 600  
 • Shield: 80  
 • Weapons: 85  
 • Repair: 0  
 • **Range:** Short  
 • **Attack Speed:** 0.8 sec

**Preemptor:** • Hull: 520  
 • Shield: 110  
 • Weapons: 250  
 • Repair: 0  
 • **Range:** Very Long  
 • **Attack Speed:** 3.0 sec

**Aurora Protector:** • Hull: 540  
 • Shield: 200  
 • Weapons: 82  
 • Repair: 0  
 • **Range:** Short  
 • **Attack Speed:** 0.7 sec

**Eclipse Monolith:** • Hull: 1000  
 • Shield: 0  
 • Weapons: 70  
 • Repair: 30  
 • **Special:** Can repair friendly ships without docking.  
 • **Range:** Very Short  
 • **Attack Speed:** 0.6 sec

#### **Capital Frigates**

*These frigate variants of capital ships provide a smaller, more numerous alternative to full capital vessels while still offering enhanced combat capabilities. They are built using separate recipes and have their own distinct base stats.*

**Juggernaut Frigate:** • Hull: 150  
 • Shield: 100  
 • Weapons: 50  
 • Repair: 0  
 • **Special:** Also acts as a Cargo ship that can carry some cargo.  
 • **Range:** Long  
 • **Attack Speed:** 0.7 sec

**Carrier Frigate:** • Hull: 140  
 • Shield: 90  
 • Weapons: 45  
 • Repair: 0  
 • **Special:** Can launch several small aircraft into battle.  
 • **Range:** Long  
 • **Attack Speed:** 0.7 sec

**Sovereign Frigate:** • Hull: 160  
 • Shield: 110  
 • Weapons: 55  
 • Repair: 0  
 • **Range:** Medium  
 • **Attack Speed:** 0.7 sec

**Preemptor Frigate:** • Hull: 130  
 • Shield: 95  
 • Weapons: 100  
 • Repair: 0  
 • **Range:** Very Long  
 • **Attack Speed:** 3.0 sec

**Protector Frigate:** • Hull: 145  
 • Shield: 100  
 • Weapons: 48  
 • Repair: 0  
 • **Range:** Medium  
 • **Attack Speed:** 0.7 sec

**Eclipse Frigate:** • Hull: 325  
 • Shield: 0  
 • Weapons: 40  
 • Repair: 20  
 • **Special:** Can repair friendly ships without docking.  
 • **Range:** Short  
 • **Attack Speed:** 1.0 sec

### **Combat and Raider Attacks**

#### **Raider Combat Overview**

**Triggering Combat:** Certain quests—especially key story missions—initiate raider attacks on target planets. When an attack is triggered, players are given the option to either let the combat resolve automatically or take direct control of their fleet.

#### **Real‑Time Combat System**

**Combat Modes:**

* **Auto-Resolve Mode:** The game calculates combat outcomes based on fleet composition, ship stats, and active upgrades. This mode is ideal for players who prefer a more streamlined experience.
* **Active Combat Mode:** Players can engage in real‑time combat, issuing commands to individual ships, repositioning their fleet, and strategically activating special abilities (such as docking a Sunflare Sloop for shield regeneration or deploying Repair Drones to restore damaged vessels). This mode introduces a tactical layer where decisions must be made on the fly.

**Key Features of Active Combat Mode:**

* **Real‑Time Decision Making:** Unlike a strictly turn‑based system, actions and responses occur continuously, giving players the opportunity to micro-manage engagements.
* **Fleet Control:** Players can directly command ship formations, prioritize target selection, and adjust tactical formations to exploit enemy vulnerabilities.
* **Dynamic Abilities:** Special mechanics such as Sunflare Sloop docking, Repair Drone deployment, and activating planet-based Shield Generators are now available in real time.
* **Tactical Pausing:** For moments when strategic planning is crucial, players can pause the action briefly to issue commands before resuming the battle.

#### **Damage Calculation and Special Mechanics**

**Damage Calculation:**

* **Shield First:** The total damage from your fleet is first applied to the enemy’s shields. Any excess damage then reduces the enemy’s hull integrity.
* **Dynamic Scaling:** Raider damage is influenced by real‑time conditions such as active defensive buffs, energy levels, and the chosen combat mode. Raider attack intensity may spike during key narrative moments or in prolonged engagements.

**Special Mechanics:**

* **Sunflare Sloop Docking:** When actively managed, players can direct a Sunflare Sloop to dock with a specific ship, granting additional shield regeneration at a defined bonus rate.
* **Repair Drones:** These units can be ordered to repair damaged ships during combat, restoring 10 HP per second in real time.
* **Shield Generators (Planetary):** If sufficient energy is available, shield generators on the planet will automatically project an extra shield bonus to nearby ships, helping mitigate incoming raider fire.

#### **Outcome and Rewards**

**Victory Conditions:**

* Successfully repelling the raider assault (either through auto-resolve or active combat) results in the defeat of enemy forces.

**Rewards:**

* Combat success unlocks new lore-filled journal entries featuring raider dialogue and narrative insights, further enriching the overarching story.

This real‑time combat system is designed to provide players with both convenience and depth. Those who prefer a more passive approach can rely on auto resolution, while players seeking a tactical challenge can dive into active fleet management during intense, dynamic engagements.

### **Quest System**

**Quest Types:**

* **Linear Story Quests:** The quest progression now follows a linear narrative where each quest must be completed in sequence. As the player progresses, the difficulty gradually increases to instill a sense of urgency. Key narrative moments and decision points are embedded within these quests, and important choices branch off the main storyline into distinct paths.
* **Random Side Quests:** Although the primary narrative is linear, additional side quests provide supplementary challenges that are dynamically tied to the player’s current progress in the main story. These quests offer extra resources and lore, remaining contextually relevant to the current act and enriching the game world without altering the main storyline.

**Quest Mechanics:**

* **Generation & Progression:** Quests are issued in a linear sequence based on the in‑game day. Each new quest builds upon the previous one, with escalating difficulty that pressures the player to complete tasks promptly. The system enforces a time-sensitive progression that makes delays more challenging and rewards swift completion.
* **Rewards & Consequences:** Completing each quest rewards the player with resources (such as Engine Parts) and unlocks a unique journal entry with lore messages from characters like Old Miner Joe, Professor Lumen, or Farmer Daisy. Additionally, key story quests present important decision points that cause the narrative to branch into different story paths, affecting subsequent challenges and outcomes.
* **Integration:** As quests are completed, entries are automatically recorded in the in‑game journal, allowing players to track their narrative progress. The branching choices, made at critical junctures, directly influence the story’s direction and the nature of future quests, reinforcing the impact of the player’s decisions on the evolving storyline.

### **Technical Architecture**

**Galactic Miners** is built using an object‑oriented approach in C++, designed for modularity and expandability. Key aspects include:

* **Class-Based Design:** The game leverages classes to encapsulate functionality for distinct systems such as resource management, planetary operations, building construction, research, crafting, fleet management, and combat. Each major entity—like **Planet**, **Player**, **Ship**, **Research**, and **Quest**—is implemented as its own class with clear interfaces, making the codebase easier to maintain and extend.
* **Modularity and Separation of Concerns:** By separating gameplay elements into discrete classes, developers can modify or extend one system (for example, adding new ship types or expanding the quest system) without impacting others. This architecture supports future updates, DLCs, or even a sequel, enabling the addition of new story arcs and gameplay mechanics with minimal refactoring.
* **Extensibility for Future Expansion:** The use of inheritance and polymorphism allows for new classes to be derived from base classes. For instance, a new type of **Ship** or **Building** can inherit common behavior from an abstract base class and override or extend functionality as needed. This approach simplifies the integration of additional gameplay elements and narrative branches.
* **Robust Data Management:** Game state is serialized to JSON for saving and loading, ensuring persistence across sessions and allowing for easy migration of data between versions. This method also supports future features like online leaderboards or cloud saves.
* **Focus on Future Scalability:** The architecture is designed with scalability in mind—whether adding more planets, enhancing the grid-based building system, or integrating multiplayer features. With clear class hierarchies and modular components, the game is well-prepared for a sequel or significant expansion, ensuring the core engine can accommodate increased complexity in story and gameplay.

This technical foundation not only supports the current scope of **Galactic Miners** but also lays the groundwork for future iterations and expansive narrative development.

### **Art Direction and Audio Design**

**Visual Style:**

* **Theme:** Minimalistic, futuristic UI with a neon cyberpunk vibe.
* **Design Philosophy:** The interface is designed to be both functional and aesthetically appealing, delivering all the necessary information to the player without clutter. Clean lines, transparent panels, and subtle neon accents help evoke the feel of a high‑tech, dystopian environment.
* **Environment Art:** Planetary surfaces, character portraits, and in‑game elements all reflect a futuristic, slightly gritty look that reinforces the narrative of a corrupt government struggling for control.

**Audio Design:**

* **Music:** The soundtrack features simplistic, repetitive electronic music with a neon cyberpunk style. The minimalist compositions use synths and ambient tones to evoke feelings of isolation, tension, and the cold mechanics of authoritarian control.
* **Sound Effects:** Crisp and digital sound effects support interactions (e.g., button clicks, resource transfers, and combat actions), ensuring they blend seamlessly with the overall futuristic aesthetic.
* **Voice Acting & Narration:** When present, voiceovers (for characters like Old Miner Joe, Professor Lumen, and Farmer Daisy) are delivered in a style that matches the somber yet hopeful tone of the narrative.

### **User Interface & Experience (UI/UX)**

**Interface Design:**

* **Minimalistic and Functional:** The UI is intentionally minimalistic with clear, easily navigable menus and dashboards. A futuristic design aesthetic is applied consistently, with neon accents, high-contrast elements, and a clean layout that prevents information overload.
* **Key Components:**
  + **Resource Dashboard:** Displays production rates, storage levels, and active supply routes in a concise, real‑time format.
  + **Grid-Based Building Interface:** An interactive grid layout (inspired by games like Factorio) enables players to arrange buildings and conveyor belts logically.
  + **Fleet Management Panel:** Presents detailed ship stats (including range and attack speed) with an option for quick command and micro-management during real‑time combat.
  + **Quest Log & Journal:** A streamlined window for tracking narrative progress, decisions, and lore entries.
* **Customization:** Players will have options to adjust UI elements for personal preference, such as scaling or repositioning panels. Additionally, real‑time settings (e.g., speed adjustments for combat) are integrated for flexibility.

**Overall Experience:** The UI and audio work in tandem to immerse the player in a dystopian, cyberpunk future—where a corrupt government exerts its power amidst neon-lit shadows. This design ensures that while the game remains visually appealing and thematic, it is also entirely focused on delivering the critical gameplay information in an accessible and intuitive manner.

### **Progression and Balancing**

**Player Progression Metrics:**

* **Difficulty Levels:** The game offers multiple difficulty settings that dictate how quickly challenges ramp up over time. At higher difficulties, players face faster-paced escalation in resource requirements and combat intensity, forcing quicker mission completions while having access to fewer surplus resources.
* **Experience and Achievements:** Players unlock achievements based on mission success, resource management efficiency, and combat performance. These metrics contribute to overall player progression, which in turn may unlock aesthetic customizations.

**Balancing Systems:**

* **Resource Production & Supply:** The scaling difficulty affects resource production rates and the size of supply routes. Lower difficulties allow for ample resources and more relaxed production chains, while higher difficulties force players to optimize their production chains and secure supply routes aggressively.
* **Combat and Tech Upgrades:** Enemy strength and raider frequency increase faster on higher difficulties, meaning combat is more challenging. Technology upgrades and research costs will also be balanced according to difficulty, ensuring that players must strategically prioritize which systems to develop in order to keep pace with escalating challenges.
* **Mission Timing:** As difficulty increases, mission timers shorten, placing added pressure on players to complete objectives swiftly. This creates a dynamic where higher difficulty settings demand quicker decision-making and resource efficiency.

**Future DLC & Expansion:**

* **Horizontal Scaling:** Future DLC will introduce more powerful and diverse technologies, units, and buildings. This expansion of the tech tree enables players to build larger, more formidable bases and fleets, enriching the gameplay experience.
* **Vertical Scaling:** In addition to horizontal additions, DLC content will provide deeper progression paths. Players can unlock new missions, storylines, and side quests that further explore the origins of the corrupt government, the history and motives behind Blackthorne's rebellion, and untold lore about other key characters.
* **Narrative Expansion:** DLC will delve into the origins of the corrupt regime, offering new story arcs and branching quests that challenge players with moral dilemmas and strategic choices. This narrative expansion aims to enhance the overall world-building and replayability of Galactic Miners.
* **Planetary Combat System:** A potential new system will allow for planetary invasions and defenses. Beyond space battles, players could engage in ground combat on planetary surfaces or asteroids—either launching invasions, defending their territory, or experiencing hybrid engagements combining ground and spaceship combat.

This progression and balancing framework ensures that players can tailor their gameplay experience based on their preferred challenge level while providing a solid foundation for future content and storytelling.